30 Years of Cystocele/Rectocele Repair in the United States

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Abstract

OBJECTIVE: A growing body of evidence suggests an increased role for apical support in the treatment of pelvic organ prolapse regardless of phenotype. The objective of this study was to determine if changes in cystocele/rectocele diagnosis and surgical management over the last 30 years reflect this changing paradigm.

METHODS: Data from the National Hospital Discharge Survey were mined from 1979-2009 for diagnosis and procedure codes. Records were categorized according to predefined combinations of diagnosis and procedure codes and weighted according to the NHDS dataset. Pearson's chi-squared test was used to evaluate the changes in population proportions over the study interval.

RESULTS: The proportion of isolated cystocele/rectocele diagnoses decreased from 1979-2009 (56.5%, n=88,548 to 34.8%, n=31,577). The proportion of isolated apical defect diagnoses increased from 1979-2009 (38.4%, n=60,223 to 60.8%, n=55,153). There was a decrease in the frequency of isolated cystocele/rectocele repair procedures performed from 1979-2009 (96.3%, n=150,980 to 67.7%, n=61,444) while there was an increase in isolated apical defect repair procedures (2.5%, n=3,929 to 22.5%, n=20,450). The proportion of cystocele/rectocele plus apical defect procedures also increased (1.2%, n=1,879 to 9.7%, n=8,806). 87.0% of all studied diagnostic groups were managed by cystocele/rectocele repair alone.

CONCLUSION: Surgeons have responded to the increased contribution of apical support defects to cystocele/rectocele by modifying their diagnostic coding practices. Unfortunately, their surgical choices remain largely rooted in an older paradigm.

Keywords: pelvic organ prolapse, cystocele, rectocele, pelvic reconstructive surgery

Introduction

While pelvic organ prolapse has been recognized and recorded for thousands of years, cystocele was first described by Swiss gynecologist Johan Peyer in the 17th century. The advancement of surgical techniques in the late 19th century led to growth in the use of operative procedures for repair of defects in the pelvic compartment. Emmet and Sims, while working together at the first women's hospital in the United States, described the pelvic fascia and its importance in repair of these defects.(1,2) In 1909 White precisely defined the support of the anterior vaginal wall and its attachments to the "white line," now referred to as the arcus tendineous fascia pelvis.(3) These descriptions are the foundation for many of the operations performed for vaginal prolapse today.

Over the last three decades, a growing body of evidence suggests an increased role for apical defects in the pathogenesis of pelvic organ prolapse regardless of phenotype. In fact, Richardson's definition of the "transverse cystocele" almost 40 years ago hinted at the importance of the apex, suggesting that repairs of cystocele focus on the diagnosis and correction of specific anatomic defects, many of which are found in the pubocervical fascia - a structure of apical support.(4,5) The literature over the last 15 years advocates for a change in practice patterns, encouraging surgeons to not only recognize the role of apical defects in pelvic organ prolapse, but to also perform concomitant procedures addressing those defects.(5–9) In 2010 Jones and colleagues

used the National Hospital Discharge Survey to describe a decrease in age-adjusted rates of inpatient prolapse procedures from 1979 to 2006, especially in patients less than 52 years of age. Interestingly, a secondary outcome of their study showed an increase in apical suspension procedures in patients greater than 52 years of age suggesting that practice patterns were reflecting the movement in favor of apical support.(10) The objective of our study was to determine if changes in cystocele/rectocele diagnosis and surgical management over the last 30 years truly reflect this changing paradigm.

Materials and Methods

Data from the National Hospital Discharge Survey (NHDS) from 1979 to 2009 were mined using the International Classification of Disease, 9th Revision, Clinical Modifications (ICD-9-CM) codes. The NHDS is a survey of inpatient utilization of non-federal short-stay hospitals in the United States; it has been administered continuously since 1965 by the Centers for Disease Control and Prevention's National Center for Health Statistics. As the NHDS dataset contains only de-identified data and is available for public use, this study was approved as an exempt protocol by the Indiana University institutional review board.

ICD-9-CM diagnosis codes for cystocele, rectocele, and apical prolapse (618.*) were extracted from the NHDS database. These records were placed into one of three groups: (1) those with a cystocele/rectocele diagnosis, (2) those with an apical defect diagnosis, and (3) those with a cystocele/rectocele diagnosis and an apical defect

diagnosis (Table 1). The data was further categorized by procedure codes (Table 2) and placed into one of three groups: (1) those who underwent cystocele/rectocele repair, (2) those who underwent apical defect repair, and (3) those who underwent cystocele/rectocele repair and apical defect repair. These categories were then further organized using the R Statistical Software (version 3.1.1) into a dataset suitable for statistical analysis.

Statistical Methodology

The dataset mined from the 1979 to 2009 National Hospital Discharge Survey (NHDS) was imported into IBM SPSS Statistics v 22 (Statistical Package for the Social Sciences, International Business Machines, Armonk, New York) for analysis. Descriptive statistics were calculated to characterize the studied population. Frequency of diagnosis and repair procedure by year were calculated and summed to obtain database totals for reporting. Pearson's Chi-Square test for association was calculated to identify any significant changes in diagnosis or repair procedure from 1979 to 2009. P values less than 0.05 were considered significant for the purpose of statistical analysis.

Results

The mean age of the studied population (n = 6,499,132) was 55 ± 16 years. Patients were predominantly Caucasian and married. All United States regions, hospital types, and hospital sizes were represented in the population (Table 3).

The database contained a total of 6,499,132 diagnosed cases of cystocele/rectocele, apical defect, or cystocele/rectocele plus apical defect. Of those diagnosed cases, 4,263,690 received operative intervention with cystocele/rectocele repair, apical defect repair, or cystocele/rectocele repair plus apical defect repair resulting in a total operation rate of 65.6%.

The proportion of isolated cystocele/rectocele diagnoses significantly decreased between 1979 (56.5%, n=88,548) and 2009 (34.8%, n=31,577). There was a reciprocal increase in the proportion of isolated apical defect diagnoses between 1979 (38.4%, n=60,223) and 2009 (60.8%, n=55,153) ($p< 0.001$) (Figure 1, solid lines).

There was a significant decrease in the frequency of isolated cystocele/rectocele repair procedures performed between 1979 (96.3%, n=150,980) and 2009 (67.7%, n=61,444). Likewise, there was an increase in isolated apical defect repair procedures for the same time period (2.5%, n=3,929 to 22.5%, n=20,450). The proportion of combined cystocele/rectocele plus apical defect repair procedures also increased (1.2%, n=1,879 to 9.7%, n=8,806) ($p<0.001$) (Figure 1, dashed lines).

As expected, isolated cystocele/rectocele repair (92%), apical defect repair (6.8%), and cystocele/rectocele and apical defect repair (18.6%) were performed most frequently when a diagnosis of cystocele/rectocele, apical defect, and cystocele/rectocele and apical defect were made, respectively ($p< 0.001$) (Figure 2, A and B). Despite these

trends, 87.0% of all cystocele/rectocele, apical defects, and cystocele/rectocele plus apical defects were managed by cystocele/rectocele repair alone (Table 4).

Comment

The results indicate paradigm shift or “drift,” as we suggest, based on the gradual rather than sudden change from cystocele/rectocele diagnoses in favor of apical defect diagnoses over the 30-year study period. Surgeons have acknowledged the contributions of apical support defects to the pathogenesis of cystocele/rectocele by modifying their diagnostic coding practices. Although procedural selection has shown some response to this increased awareness, surgical practice remains largely rooted in an older paradigm. Cystocele/rectocele repair remains the procedure of choice for pelvic support defects independent of diagnoses despite the marked increase in apical defect diagnoses over the study period.

There are several possible explanations for these findings. First, it is possible that surgeons, in acknowledging the changing paradigm, have increased the number of apical support defect diagnoses but still choose the least invasive approach to achieve symptom resolution. The paradigm “drift” predates the introduction of prolapse mesh kits in 2001, making it unlikely that a surgical procedure designed to concurrently correct cystocele, and rectocele with apical support defects dictated this change. Additionally, given the design of our study, it is not possible to determine the surgical approach (transabdominal or transvaginal). One could presume that transabdominal procedures address primarily apical support whereas transvaginal procedures

potentially address both. Likewise, the dataset itself makes it impossible to determine the specialty or subspecialty training of a particular surgeon.

We believe that the most plausible explanation is best described by Maslow's hammer phenomenon, popularly phrased as "if all you have is a hammer, everything looks like a nail." The history of modern medicine has demonstrated that our knowledge of disease etiology often precedes the ability to effectively intervene. Westfall and colleagues suggest that it takes an average of 17 years for academic research to translate into clinical practice.(11) It is highly likely that a delay in surgical response to a diagnostic paradigm “drift” is due to time required for surgical skill acquisition. Conventional laparoscopic and vaginal approaches to apical support defect repair have a prolonged learning curve making this surgical skill more difficult to acquire. This 30-year study period encompasses an era of great change in technology and surgical technique with a shift from laparotomy toward less invasive techniques. It is likely that, with this change, the number of apical suspension procedures occurring via laparotomy has declined and our skills in minimally invasive apical suspension procedures have yet to cover this ground. We predict that the increasing availability of robotic surgery will make laparoscopic apical suspension techniques more accessible to a broader group of surgeons with varied training backgrounds. Additionally, continued focus on the importance of apical support will likely encourage more gynecologic laparoscopists and vaginal surgeons to adopt apical procedures.

This focus on apical support should be driven by FPMRS trained surgeons who have at their disposal a deep understanding of both the anatomy associated with apical defects and the techniques to prevent and repair them. The steady growth of FPMRS fellowship programs from 21 in 1998 to 54 at the time of publication (157%) will help to support this goal.(12, 13) Likewise, the increasing number of fellowships in minimally invasive gynecologic surgery (MIGS) (500% since 2001) provides another group of trained educators and mentors who should encourage adoption of apical support techniques.(14, 15)

Finally, as ACOG continues to advocate vaginal hysterectomy as the preferred route, the teaching of these skills to trainees should also include a focus on effective methods of apical support at the time of cuff closure.(16)

A major limitation of this study is the potential for misclassification bias inherent in any large multi-center database where there is no standardization of diagnostic and procedural code assignment. There were multiple areas in which miscoding could occur, including the possible assignment of codes by support staff rather than clinicians, reimbursement motivated coding preferences, and other sources of systematic error. Prior reports suggest, however, that the NHDS dataset has an acceptable medical coding error rate of approximately 4.3%.(17)

Procedural coding guidelines and the codes themselves also change over time, which introduces anomalies into such a large dataset. This study was no exception. For

example, the current ICD-9-CM code for sacral colpo/hysteropexy would likely be 70.78 (vaginal suspension and fixation with graft or prosthesis). This code was adopted in 2007; this explains the considerable drop in diagnoses of cystocele/rectocele and apical defects after 2006. Before 2007 all sacral colpo/hysteropexy procedures are included in the 70.77 (vaginal suspension and fixation) code group reported in this study. The considerable drop in diagnoses of cystocele/rectocele and apical defects from 2006 to 2007 can be best explained by an anomaly in the dataset itself. That said, these diagnoses, when expressed as a percentage of all diagnoses in the same years, follow the trend described in our study.

In conclusion, this retrospective data analysis shows a decrease in cystocele/rectocele diagnoses and a concomitant increase in apical defect diagnoses for pelvic organ prolapse over the 30-year study period. While this change is consistent with data supporting a greater role for apical defects in the underlying pathogenesis of prolapse, the change in surgical practice is not occurring at the same rate. We believe this is an example of Maslow's hammer phenomenon, “When all you have is a hammer, everything looks like a nail.” We predict that with focused teaching by fellowship trained FPMRS physicians and the increasing role of minimally invasive techniques, including robotic surgery, laparoscopic apical suspension techniques will be available to a broader population of women who suffer from pelvic organ prolapse.

References

1. Wall LL. Thomas Addis Emmet, the vesicovaginal fistula, and the origins of reconstructive gynecologic surgery. *International Urogynecology Journal and Pelvic Floor Dysfunction*. 2002;145–55.

2. Emge LA, Durfee RB. Pelvic organ prolapse: four thousand years of treatment. *Clin Obstet Gynecol*. 1966;9(4):997–1032.

3. White GR. Cystocele--a radical cure by suturing lateral sulci of the vagina to the white line of pelvic fascia. 1909. *Int Urogynecol J Pelvic Floor Dysfunct*. 1997;8(5):288–92.

4. Richardson AC, Lyon JB, Williams NL. A new look at pelvic relaxation. *Am J Obstet Gynecol*. 1976;126(5):568–73.

5. Rooney K, Kenton K, Mueller ER, FitzGerald MP, Brubaker L. Advanced anterior vaginal wall prolapse is highly correlated with apical prolapse. *Am J Obstet Gynecol*. 2006;195:1837–40.

6. Shull BL. Pelvic organ prolapse: Anterior, superior, and posterior vaginal segment defects. *Am J Obstet Gynecol*. 1999;181(1):6–11.

7. Hsu Y, Chen L, Summers A, Ashton-Miller J, DeLancey JOL. Anterior vaginal wall length and degree of anterior compartment prolapse seen on dynamic MRI. *Int Urogynecol J Pelvic Floor Dysfunct*. 2008;19(1):137–42.

8. Chen L, Ashton-Miller JA, Hsu Y, DeLancey JOL. Interaction among apical support, levator ani impairment, and anterior vaginal wall prolapse. *Obstet Gynecol*. 2006;108:324–32.

9. Elliott CS, Yeh J, Comiter C V, Chen B, Sokol ER. The predictive value of a cystocele for concomitant vaginal apical prolapse. *J Urol*. 2013;189(1):200–3.

10. Jones K, Shepherd JP, Oliphant SS, Wang L, Bunker CH, Lowder JL. Trends in inpatient prolapse procedures in the United States, 1979-2006. *Am J Obstet Gynecol*. 2010;202(5):501–507.

11. Westfall JM, Mold J, Fagnan L. Practice-based research--“Blue Highways” on the NIH roadmap. *JAMA*. 2007;297(4):403–6.

12. American Urogynecologic Society. Fellowship Listing, 1998. Available at: https://web.archive.org/web/19980215213452/http://www.augs.org/fellowship.html . Retrieved Sep 11, 2015.

13. American Urogynecologic Society. ACGME Accredited Fellowship Programs List. Available at: http://www.augs.org/p/cm/ld/fid=79. Retrieved Sep 11, 2015.

14. American Association of Gynecologic Laparoscopists. FMIGS History. Available at: https://www.aagl.org/service/fellowships/history/. Retrieved Sep 11, 2015.

15. American Association of Gynecologic Laparoscopists. Two-Year Fellowship in MIGS. Available at: https://www.aagl.org/service/fellowships/. Retrieved Sep 11, 2015.

16. Choosing the route of hysterectomy for benign disease. ACOG Committee Opinion No. 444. American College of Obstetricians and Gynecologists. *Obstet Gynecol* 2009;114:1156–8.

17. Dennison C, Pokras R. Design and operation of the National Hospital Discharge Survey: 1988 redesign. *Vital Health Stat*. 2000;(39):1–42.

Figure 1. Diagnoses assigned and procedures performed for prolapse, 1979-2009

Figure 2A. Proportion of procedures performed for diagnosis of cystocele/rectocele, 1979-2009

Figure 2B. Proportion of procedures performed for diagnosis of apical defect, 1979-2009

Table 1. ICD-9-CM diagnosis codes for prolapse.

Diagnostic Group	ICD-9 Code	Diagnosis Description
Apical codes	618.1	Uterine prolapse without mention of vaginal wall prolapse
	618.2	Uterovaginal prolapse, incomplete
	618.3	Uterovaginal prolapse, complete
	618.4	Uterovaginal prolapse, unspecified
	618.5	Prolapse of vaginal vault after hysterectomy
Anterior and posterior vaginal wall codes	618.0	Prolapse of vaginal walls without mention of uterine prolapse
	618.01	Cystocele, midline (Cystocele NOS)
	618.02	Cystocele, lateral (Paravaginal)
	618.04	Rectocele (Proctocele)

Table 2. ICD-9-CM procedure codes for prolapse.

Procedural Group	ICD-9 Code	Procedure Description
Cystocele and rectocele procedure codes	70.5	Repair of cystocele and rectocele
	70.51	Repair of cystocele; Anterior colporrhaphy (with urethrocele repair)
	70.52	Repair of rectocele; Posterior colporrhaphy
Apical procedure codes	69.22	Other uterine suspension; Hysteropexy, Manchester operation, Plication of uterine ligament
	70.77	Vaginal suspension and fixation

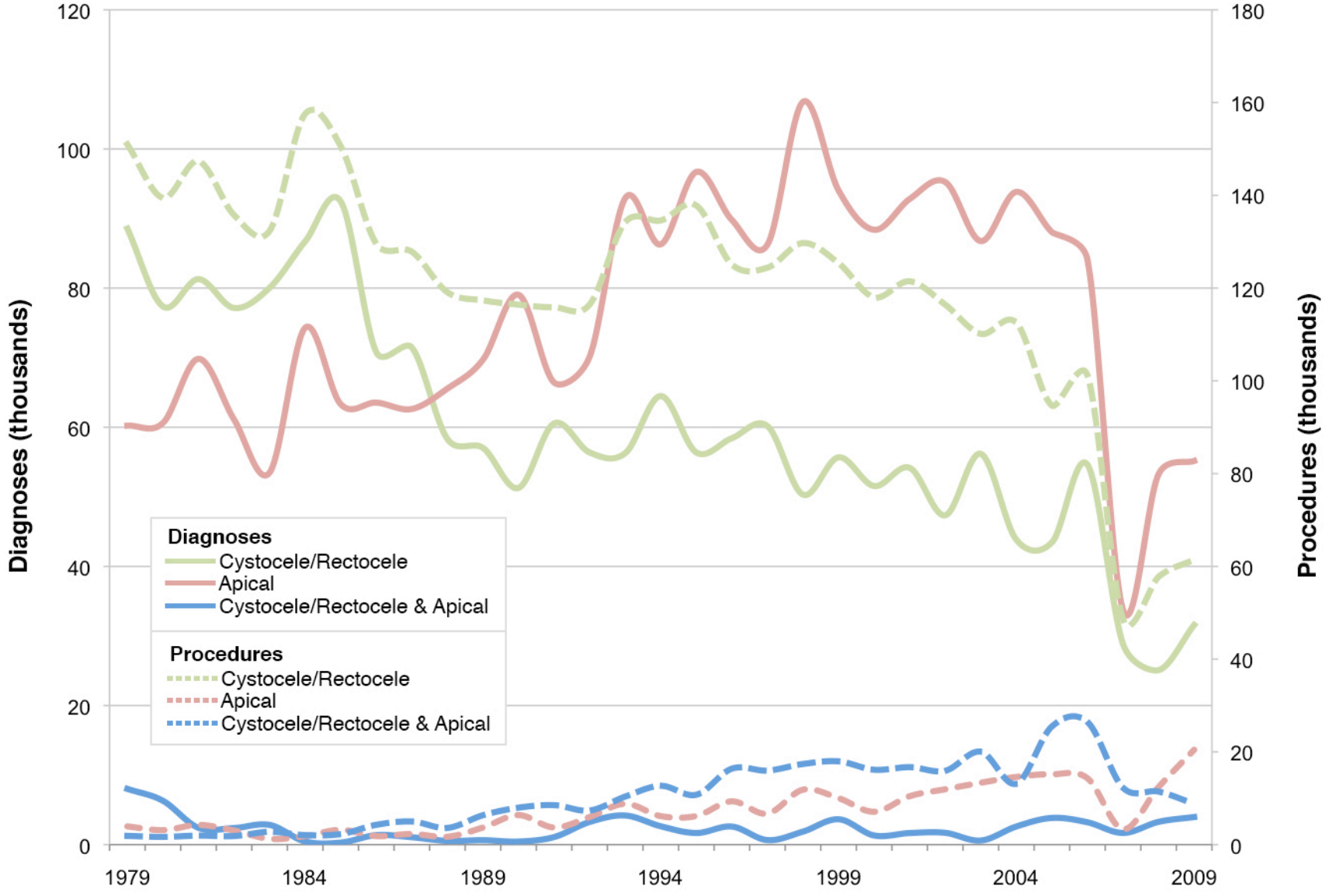
Table 3. Socio-demographic characteristics of patients (weighted sample), n=6,499,132

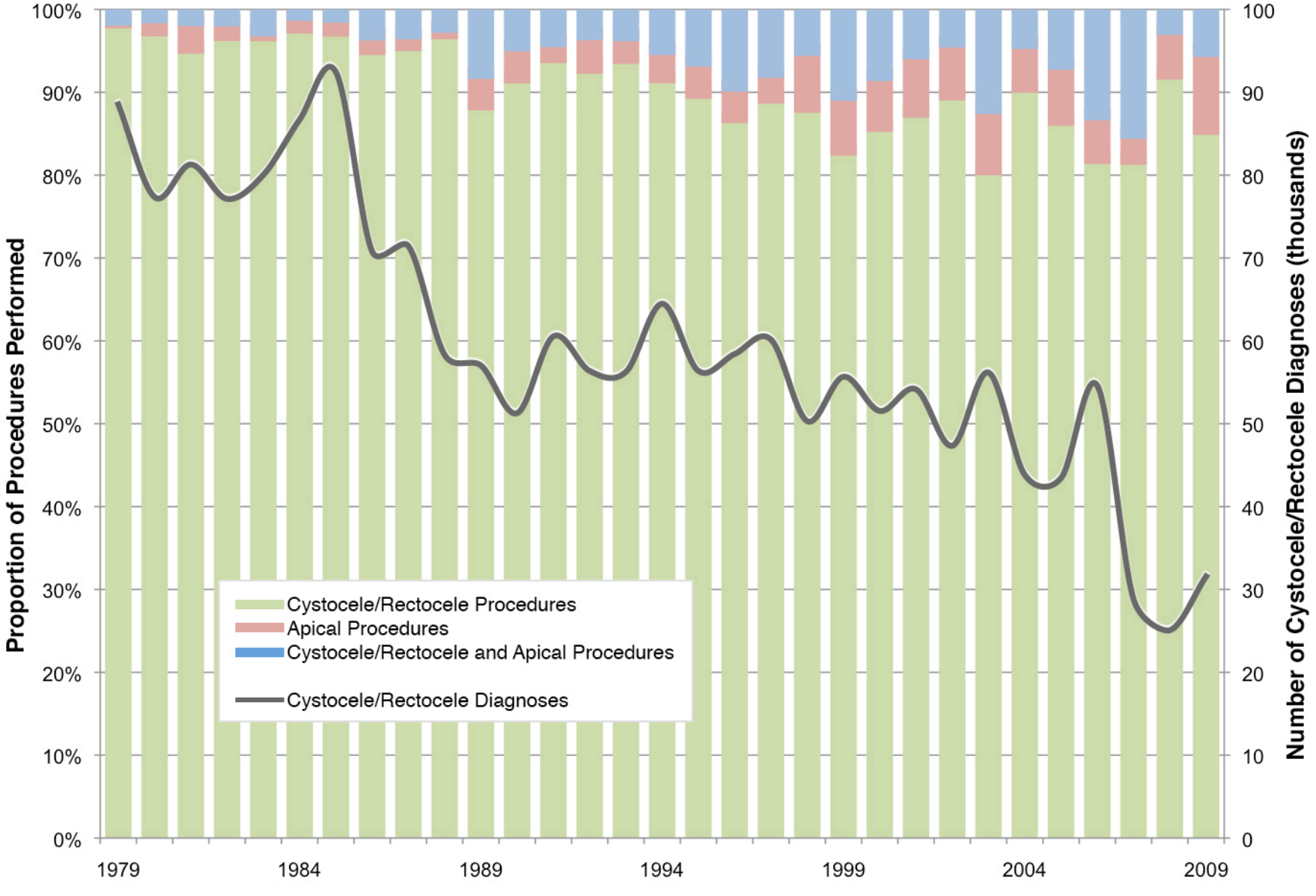
Variable	%
Age	55 ± 16*
Race	
Caucasian	76.4
Not Stated	17.3
Black	3.7
Other	1.6
Asian	0.6
American Indian or Alaskan Native	0.3
Multiple Race Indicated	<0.1
Native Hawaiian or Other Pacific Islander	<0.1
Marital Status	
Married	49.6
Not Stated	26.5
Widowed	10.9
Divorced	5.7
Single	4.3
Other	2.3
Separated	0.8
U.S. Region	
South	40.5
Midwest	24.6
West	19.2
Northeast	15.7
Hospital Type	
Non-profit, including church	74.7
Government	13.5
Proprietary	11.8
Hospital Bed Size	
100 – 199	26.1
200 – 299	19.8
300 – 499	22.8
500+	12.9

* Mean age in years ± standard deviation

Table 4. Frequency of prolapse diagnosis by surgical procedure performed

Diagnostic Group	Cystocele/Rectocele Procedures	Apical Procedures	Cystocele/Rectocele and Apical Procedures
Cystocele/Rectocele Diagnosis	1,700,533 (92%)	63,880 (3.5%)	83,190 (4.5%)
Apical Defect Diagnosis	1,955,353 (83.4%)	159,758 (6.8%)	228,767 (9.8%)
Cystocele/Rectocele and Apical Defect Diagnoses	54,115 (74.9%)	4,673 (6.5%)	13,421 (18.6%)
Total	3,710,001 (87%)	228,311 (5.4%)	325,378 (7.6%)


Diagnoses (thousands)
Procedures (thousands)
120
100
80
60
40
20
0
180
160
140
120
100
80
60
40
20
0
1979
1984
1989
1994
1999
2004
2009
Diagnoses
Cystocele/Rectocele
Apical
Cystocele/Rectocele & Apical
Procedures
Cystocele/Rectocele
Apical
Cystocele/Rectocele & Apical


Proportion of Procedures Performed
Number of Cystocele/Rectocele Diagnoses (thousands)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
100
90
80
70
60
50
40
30
20
10
0
1979
1984
1989
1994
1999
2004
2009
Cystocele/Rectocele Procedures
Apical Procedures
Cystocele/Rectocele and Apical Procedures
Cystocele/Rectocele Diagnoses

Proportion of Procedures Performed
Number of Apical Defect Diagnoses (thousands)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
120
100
80
60
40
20
0
1979
1984
1989
1994
1999
2004
2009
Cystocele/Rectocele Procedures
Apical Procedures
Cystocele/Rectocele and Apical Procedures
Apical Defect Diagnoses